TITLE OF INVENTION

This application claims priority under 35 U.S.C. 119 (e) to U.S. provisional application 60/413085 filed 9/24/2002.

INVENTOR: Steven Hamrick U.S. CITIZEN
444 Carthage Ave.
Kent, Ohio 44240

The axel popper - Forked wedge separator
A hand tool for separating c/v halfshafts from the transaxel on front wheel drive and rear drive automobiles with front wheel drive set up transaxels.

BACKROUND OF INVENTION

Fork wedge separators have been around for many years.They have many uses and the idea of them is not new.As automobiles have changed over the years so has the tooling changed to keep up with the need for repair in an efficient and inexpensive way.

With the introduction of the front wheel drive transaxel in the auto industry . We were given the c/v halfshaft. These have to removed for a number of reasons. To remove , repair or replace the transaxel.To replace the seal for the c/v halfshaft and to repair or replace the c/v halfshaft, boot or the c/v joint itself.

Some c/v shafts will come out with little force. But almost all of them require a good to great forcing out. Mechanics almost always use some kind of prybar to get it out. Hard work and danger of the prybar slipping. A prybar is not supported on both sides. Sometimes the prybar wont even get the c/v shaft out at all. Futhermore if the mechanic does not have the benifit of a car lift and is working on the ground.He/she dosen't have any room of to get a pry bar in place. On a hard to get out shaft it makes for an imposible part of the job and is very dangerous if the car is on a jack or blocks. The priing action can push the car over causing it to fall.

There are special tools designed for removing the c/v shaft. Like the J-35910. This tool has to be assembled to a slidehammer. This is expensive given the attachments and all. It is also clumsy and requires generous space to be used. In alot of cases it wont even fit in between the transaxel and the halfshaft. Thus wasted time, money and space.

There are other forked wedge separators. None are specifically made to do the job of removing the c/v halfshafts from front wheel drive and rear wheel drive with front wheel drive set up transaxels.

Patterson pat # 5,103,544. This tool is an attachment for an air hammer. It is designed to remove the c/v joints from the c/v shaft. Not for removing the c/v joints and shaft from a transaxel and it will not work in this case.

One however - Baker pat # 5,095,604 could possibly do the job but this is not any of their claims. It is adjustable in either one or two places and is more subject to brake under the strain provided by most shaft removals. Especially when hammering on it sideways. It is not made for that. Only hammering on the butt of the handle. At the very least it will not adjust as nicely after some use. In closwith Baker, it costs more to make. They do more to manufacture it.

SUMMARY

This invention is a forked wedge separator. It goes between the transaxel and the c/v halfshaft. Usualy the flat part of the tapered edge of the fork goes against the transaxel. However, there are models where there have been an advantage to putting the tapered edge against the transaxel. So a mechanic should be at liberty on how the tool works best for him/her on any given model.
By hitting on the butt of The axel popper. The tool is driven straight in. Once the tool is in it is then hit on the side of the handle to finish nocking out the c/v halfshaft. On some models the c/v joint housing is far enough away that the axel popper can slide straight in without any hammering on the butt of the handle. In this case you need only to hit on the side of the handle of the tool. (Going away from the transaxel toward the halfshaft.) It can also be used by priing.

The axel popper is supported on both sides and gives even pressure to each side of the c/v joint housing. This prevents sliping and also keeps the shaft from going into a angled to one side position which is caused by triing to pry it out with a prybar. This will only lock in harder a hard to get out shaft. The axel popper will force out even most stubborn shaft.

Continued in column 3.

SUMMARY CONTINUED

With the striking of a hammer or any hitting object, the axel popper is now doing most of the work for you. Much more safe than pushing hard on a car.

The shorter handled version allows mechanics working on the ground to work with comfort and success. To those on a car lift. They have the choice of a longer handle for comfort and safety. (Possible hand hammering from the swing room avalible.) Nothing changes form size to size with the axel popper. Only the handle length. There are currently 4 sizes availible the 9", 12",15" and 18".The inches are measured by the overall length of the tool. Special orders of any size or shape can be made.

The axel popper has other names such as The c/v halfshaft wedge the golden rod.(Do to its coloring in final processing.) Or any combination of these words. The axel popper is the most poppular.

The axel popper does get in where specialty tools for this job can't. It is not assembled. Needs alot less space to be used.Very important in repairing todays cars. It costs less to manufacture for it is a simply cut out and tapered one piece tool.

It is made specially for this job and holds up great under the stress of removing a halfshaft. Even when being hammered in the sideways form.

The axel popper will work great on a said 80% to 85% of all front wheel drive and rear wheel drive with front wheel drive set up transaxels in this one shape and sizes form without any special ordering of shape or size.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWING

(Fig. 1 A) Is a side view of The axel popper. 1 is the tapered section of the forkes. 2 is the handle of the tool. 3, the shaded area, is a 5/16"hole drilled through the handle. This is a life size drawing of the 9" tool. All measurements taken from this drawing will make the actual tool.

(Fig. 1 B) Is a top view of The axel popper. 1, the shaded area, is the tapered section of the forks. 2 is the handle of the tool. 3 is a 5/16"hole drilled

through the handle. 4 is a widened section of the handle. Which helps prevent tool slipping and hand hammering. This too is a life size drawing of the 9" tool. All measurements taken from this drawing will make the actual tool. For longer handled tools we just make the handle section of the tool longer. 3" each size.

(Fig 2 A) Shows a typical front wheel drive set up transaxel. The axel popper in this picture shows where it is inserted for halfshaft removel. 5 is the 18" long tool. 6 is the 9" long tool. 7 is transaxel. 8 is the left side c/v halfshaft. 9 is the right side c/v halfshaft.

(Fig. 2 B) is a 3-D view of the axel popper.

DETAILED DESCRIPTION OF THE INVENTION

DESCRIPTION OF THE PREFERRED EMBODIMENT

Although their are many ways to manufacture the simple tool of the axel popper. Currently the most inexpensive in massproducing is as follows. A 1/2" thick 4' x 8' sheet of hot roll pickel & oil, which is a mild steel, (# A-36) is placed on a table used for cutting said sheet of steel. A program for cutting out the design of a axel popper is used to guide a torch ,plasma cutter or laser. This can be updated as technology progresses. Whether it be a 9", 12", 15", 18" or any shape or size special ordered by a consumer, it is cut out. A U shaped fork in made on one end. Fig 1 B #1.The U shape measures 3" from outside one fork to the out side of the other. Each fork is 1/2"in width. Leaving 2" from the inside of one fork to the inside of the other. From the tip of the U to the base of the U it measures 2 1/2". This U shape is used to accommodate structure needed to get between the transaxel and the c/v halfshaft. Hold it firmly and sucessfully pop it out. Fig 2 A #7 #8 & #9.

This U is tapered Fig. 1 A #1 & 1 B #1. leaving atleast 1/16" on the tip. To keep it blunt in safety for consumers and to keep it uniform during processing. The taper goes form the tip of the U on the tip of the tool, up the forks 2 1/8"Fig 1 B #1. The taper is used when separating a c/v housing from a transaxel and it is verry close to the transaxel. This is done by driving it straight in Fig 2 A #5 & #6. By hiting on the butt of the handle. Then it is hit on the side of the butt of the handle Fig. 1 A #3 to finish nocking it out. When the inner c/v housing is far enough away from the transaxel and the tool's U shape

slides in place with no hamming. The tool is just hammerd on the side of the butt of the handle Fig. 1 A #3 to nock out the shaft Fig. 2 A #5 & #6.The hammering can been done by any hitting or hammering device such as a claw or sledge hammer. But not limited to such. The taper is made when the tool is placed in a cut off saw jig and clamped down. The cut off saw is run over the U end of the tool making the necessary angle mentioned above by the measurement given.

When being burned out the tool is also given a handle. Fig. 1 A #2 Fig. 1 B #2. When a mechanic is working on or near the ground. He/She needs a shorter handle to have swing room in hitting the tool successfuly. Thus the 9" pictured in Fig. 1 A & Fig. 1 B in life size. When a mechanic is working on a car lift. A longer handle in used for comfort so that the mechanic is not having to reach way up into the car. He /She is able to relax standing and hammering. The axel popper can also be used in a prybar fashion. supported on both sides is more safe than any regular prybar. This can test how hard any given shaft will be to get out. Though it works best with a hammer in the perscribed fasion. With the different sizes avalible 9", 12", 15" & 18". Nothing ch anges but the handle length. 3" per size. A mechanic can choose the size their most comfortable with or will need in any given circumstance. They can special order any shape or size they think will be helpful to them. The butt of the handle is made slightly wider than the handle itself Fig. 1 B #4. When the top view is observed. This is done to prethe tool from slipping out of one's hand and to prevent hand hammering by giving a lager hitting area.

The handle's butt is placed in a drill press jig set up to lay the drilling spot right under the drill bit. The tool is clamped down. A 5/16 hole is made into the center of the handle's butt. Fig. 1 B #3. The hole is good for hanging up the tool in storage. For bolting two tools back to back if necessary. 5/16 bolt hole is sufficient enough for the task. Most importantly the hole is neeeded for quik processing. It has been

claimed that it is much more easy to get a hold of the tool during manufacturing.Getting a hold of it has been said to be very important during the manufacturing especially when accomplishing the barrel plating. The barrel plating is done after the a final grinding or wire brushing necessary to clean up any steel birs left on the tool from processing. The tool is put in a barrel with a zinc plating substance and a yellow dicromate is also used. This gives it a gold like color. This plating is done to give the tool a nice look and to prevent it from rusting on a shelf waiting to be sold. The plating will keep the tool looking as nice as possible while being owend and used by a mechanic.

Certain tool companys would like to see this tool hardened for greater life expectancy and durability. The tool is baked until it reaches the harden specification wanted by those companys. The baking removes steel impuritys. Thus making it harder. If the tool is to be hardened it is not as easy for the plating company to compeir task of plating. This this kind of stuff raises the cost and quality of the tool. This would be sold to the professional mechanic. Otherwize without hardening is the way to go for the casual or the backyard mechanic.

In comparison to previous inventions,whether patented or not there are specialty tools designed to do the job of halfshaft removal from the transaxel. Like the J-35910. It has to be assembled to a slidehammer every time you need to use it. It requires generous space to use and is clumsy to use. In alot of cases it wont even fit in between the halfshaft and the transaxel to do the removing of the shaft. The axel popper is put in place without a necessary assembling. Using a small amount of space it can get in between some of the tightest places for removing the shaft from transaxel. Far from being clumsy. The axel popper is less expensive not needing a slidehammer and attachments. It can be used with any hand held hammer or hitting object. There are other forked wedge separators. None are specifically made to do the job of removing c/v halfshafts form a transaxel. And they will not remove the shaft by reason of not fitting. There is one forked wedge separator that could do the job of shaft removal. Baker Pat. # 5,095,604. This is not their claim and there would be flaws in using their tool for this job. Their tool is adjustible in either one or two places. This makes the tool easier brooken and harder adjust after some use. This is mainly do to the need to hammer the tool in a sideways fashion. To remove the halfshaft. The baker tool is designed for hammering straight

into an object for the separation of two object. It is not for hammering sideways. The axel popper is one piece. It is not adjustible, except in design,and is less likely to brake especially when hammered in the sideways fashion. The axel popper would cost less to manufacture. Less is done to create it.

Patterson Pat. # 5,103,544 should not confused here with the axel popper. It removes the c/v joint from the c/v shaft. Not the c/v shaft and joints from the transaxel. The inventions here are so different form the axel popper. That improving upon then would not have been the main focus. Other than that of Baker. (Different handle lenghts, one piece tool and or special orders of shapes and sizes from consumers .) What has been improved on here is the job of removing a c/v halfshaft from the transaxel. If you doubt this or would investigate whether or not this is true. I invite you to find out how much easier i have made the likes of this job to do for myself and others.